



Ecosystem Science Program Review

Southeast Fisheries Science Center Summary and Response

Introduction

On March 14-18, 2016, the Southeast Fisheries Science Center (SEFSC) conducted a peer review of their ecosystem science programs. This is the fourth in a synchronized cycle of peer reviews being conducted within each of NOAA Fisheries' six fisheries science centers and the Office of Science and Technology. This report represents the SEFSC's response to key findings and recommendations made by our review panel and an action plan for implementing improvements to the program, based on those recommendations.

The terms of reference, agenda, background materials, presentations and the panelists' full reports for this review may be found at:

http://www.sefsc.noaa.gov/program_reviews/2016/default.htm

The week's agenda was organized to reflect work being conducted in each of the large marine ecosystems within our jurisdiction and approaches we're taking to provide living marine resource science advice and products that are generated in a more holistic, ecosystem context. An overview presentation was used to kick off the review and provide context for the sessions. Focused sessions were held to discuss ecosystem science to support freshwater flow for coastal ecosystems; pelagic ecosystems; ecosystem science to support sustainable fisheries; progress on integrated ecosystem assessments and ecosystem modeling; a case study evaluating our ecosystem science capabilities measured by our contributions to the response, damage assessment and restoration planning in the Deepwater Horizon Oil Spill; coral reef ecosystem science; our draft Regional Action Plan for the National Climate Science Strategy and ultimately our vision for ecosystem science programs going into the future.

The review's Terms of Reference asked panelists to consider some overarching questions over the course of the review week that relate back to four program components:

- 1) Management context and strategic planning
- 2) Data collections
- 3) Modeling and analysis
- 4) Incorporation into Management and Communications

The format used to describe our ecosystem science included presentations, a poster session, discussion sessions with panels comprised of SEFSC scientists and our management partners,

and question and answer periods. Each day was capped off with a public comment period to enable stakeholders the opportunity to provide their input to the panelists.

The full suite of panelists' reports and recommendations and this synthesis and response report will be maintained as a reference to help guide decisions for ecosystem science going into the future, and as a benchmark against which to measure our progress in improving the program.

Acknowledgements

Thanks are extended to the panelists for the significant amount of time and care they invested in preparing for and conducting this review. They brought to the table a breadth of expertise and experiences and those unique perspectives provided for a rich collection of findings and recommendations we can use to strengthen the SEFSC's programs. The panelists for this review were:

- Jake Rice (Chair) – Canada Department of Fisheries and Oceans (Emeritus)
- Peter Ortner - University of Miami Rosenstiel School of Marine & Atmospheric Science (Emeritus)
- Charles Birkeland – University of Hawaii, Hawaii Cooperative Fisheries Research Unit (Emeritus)
- Albert Hermann – Pacific Marine Environmental Lab / Joint Institute for the Study of the Atmosphere and Ocean (NOAA OAR)
- Jon Hare – NOAA Fisheries, Northeast Fisheries Science Center

Thanks are extended to Stacy Hargrove and Jennifer Schull, who coordinated this review within the SEFSC. We're also grateful to the many partners and stakeholders who attended, gave public comments, and agreed to serve on discussion panels to provide their perspectives to the panelists.

Finally, the SEFSC scientists are recognized for their efforts to advance ecosystem science in the region to improve the quality of advice and products we supply to managers and policy makers. Many were involved in designing the approach for and participating in this review and these efforts are acknowledged. The work presented over the course of the week actually reflects the efforts of the entire scientific and support teams at the SEFSC and thanks are extended to them.

Response to Key Panel Recommendations

The panelists provided a broad range of observations and recommendations in their reports that are invaluable in guiding the evolution of our programs in the region. Significant findings are recommendations that will form the basis of our action plan for program improvements are highlighted here.

Management Context and Strategic Planning

The organization of ecosystem science efforts in the SEFSC was raised in a session of the review. This session summarized progress made in advancing ecosystem science in the region, shared a vision for the future of ecosystem science in the region and discussed alternative models for how programs should be structured going forward. A range of approaches were discussed that included: 1) consolidation of ecosystem science into one

Center-wide division; and 2) continuing a de-centralized approach but focusing those efforts by developing specialized teams from across the geographic and disciplinary range of the SEFSC to address specific issues according to an overall plan. The latter approach was endorsed by the review panel, provided adequate long-range thinking went into developing a work plan that set priorities and guided project management. Reviewers observed that scientists and managers in the region face a number of issues that can benefit from an ecosystem-based approach (e.g., science supporting Endangered Species Act, invasive species, aquaculture expansion, bycatch, oil and gas development, water diversion) but that no clear priorities have been set among them.

Recommendations:

- **A tight and binding Strategic Plan is not needed.**
- **Develop an “issue” prioritization for the SEFSC and then communicate this to staff and partners.**
- **Some overarching vision for how progress on ecosystem science can be collective rather than project-by-project might facilitate both more ambitious planning and better communication with clients and partners.**
- **Develop a list of funding opportunities and communicate to staff annually with a list of SEFSC priorities.**
- **To maintain creativity, keep the teams bureaucracy light and expert driven.**

Response: The SEFSC concurs that the specialized team approach is well suited to tackle specific ecosystem issues in the region, but that care must be taken to build these teams and to conduct their work with a strong and shared notion of priorities among our scientists and the managers who rely on our science products and advice. A strong work plan will also facilitate project management to orchestrate timing, workflow and deliverables for the projects. Seeking extramural funding to support ecosystem science is crucial to our progress, and the work plan will guide grantsmanship for extramural funding to maintain focused programs that target the Center’s highest priorities.

Reviewers raised the importance of partnerships as a means of leveraging capacity and capabilities and enhancing ecosystem programs in the SEFSC. Partnerships will be crucial for addressing a demand for ecosystem science that exceeds the resources to meet that demand.

Recommendations:

- **Develop greater interaction with the Northeast Fisheries Science Center (NEFSC) and the Chesapeake Bay Office.**
- **Evaluate opportunities and barriers to citizen science.**
- **Work with NOAA’s National Ocean Service on place-based mapping.**

Response: The SEFSC concurs with this recommendation and commits to exploring the means to catalyze stronger and more intentional collaborations with our colleagues in our region, collaborating with other parts of NOAA to leverage mapping and modeling capabilities and will continue to work with the fishing industry via Cooperative Research and citizen science approaches.

Reviewers stressed how crucial a strong social science program is to successful execution of ecosystem-based fisheries management, stating that, “given how many of our challenges are rooted in human decisions...a strong social science presence is a requirement if all the natural science work is really going to pay more than minor benefits.”

Recommendations:

- **Hiring more social scientists is an obvious step. There will have to be serious discussions at several levels of NOAA about how to acquire and use other knowledge systems in adding to the information on how human well-being in these areas is affected by the marine and coastal ecosystems. These experts also need to be much more integrated into ecosystem research teams on scales from local to coastwide.**
- **Leaders need to encourage planning approaches which more completely reflect “full ecosystem thinking” in terms of the human dimension of the ecosystem, not just ecosystem thinking about the bio-physical parameters.**

Response: We agree additional social scientists would strengthen our programs and we will take this under advisement as our budget evolves. Meantime, ecosystem science will be included as a topic for the FY17 social science program review to be able to evaluate this work in the context of their full portfolio.

Ecosystem Data

Panelists found that the SEFSC shares the very common challenge of advancing ecosystem science in the absence of sufficient data. Our habitat science efforts, particularly in coastal regions, were highlighted by reviewers as one of our successful areas in terms of progress in narrowing the data gap. The importance of gaining a better understanding of physical oceanographic processes in offshore waters was highlighted, but given the pressures the coastal environments have and are projected to face, reviewers endorsed a continued emphasis on the coastal habitat work while working to improve our offshore collections. Recommendations were also made pertaining to stewardship of data holdings.

Recommendations:

- **Coordinated action from NOAA leadership is required to ensure that data are more accessible.**
- **Consider distributed systems that integrate data from different databases as a data management approach for ecosystem work. Explore existing tools for managing distributed data before/rather than constructing new systems.**
- **Evaluate the adequacy of SEFSC IT resources for supporting mission-critical activities now and going into the future.**
- **The use of long-term data and experimental design in the Florida Key reef fish monitoring program and the coral program were excellent and serve as an example of the utility of formal hypothesis testing to management.**
- **For coral reef fishes, maintain or increase the emphasis on size/age composition rather than just trends in biomass.**
- **There is no question that the annual surveys need to be continued and thoughtfully integrated into a comprehensive monitoring program. It was apparent (and recognized by the nascent regional Climate Strategy group) that there is an enormous cost effective opportunity to piggyback additional biological (lower tropic level**

typically), physical and chemical sampling using the survey platforms and this is true both in the GoM and SATL.

Response: The SEFSC concurs with these recommendations. Significant progress has been made to reach compliance with the Executive Order on Public Access to Research Results (PARR). Continued investments in this effort will be made to improve access to ecosystem data for our science partners, managers and for our own team. As the prioritization process, noted in the earlier section, is established, data management and computing requirements for executing work on those priorities will be evaluated and included in project management plans.

It is heartening to see the experimental design and long-term data collection in the Florida Keys reef fish monitoring called out as a positive example of the strength of a well-designed program in supporting management. This approach to surveying coral reef-associated fish is being employed throughout our jurisdiction and beyond.

An analysis and evaluation of current survey efforts will be conducted in FY17 to tune our approach for setting priorities and to look for opportunities to piggyback data collections.

Some specific advice on data collections was offered up in the reviewer reports.

Recommendations:

- **The SEFSC should consider adding a Food Habits program to the SEAMAP trawl and/or trap surveys in the Gulf of Mexico and along the Southeast U.S. Shelf.**
- **The extent of geographic and seasonal bias in diet sampling should be reviewed in all diet data used to parameterize trophodynamic models and what the impact of those biases are on model performance.**
- **(Note: In reference to Deepwater Horizon Data Collections) It would be more than unfortunate if all the data and samples collected were not analyzed, what one presenter called a “post-mortem” were not conducted and if the new funding coming to the Gulf over the coming decades did not support a comprehensive integrated Gulf-wide monitoring effort (by integrated I mean biological, physical, chemical measurements AND models).**

Response: Some data collection on food habits has been done, but it is clear that it is an important priority for advancing ecosystem modeling work being done in the region and one for which additional emphasis is justified. The concern about temporal and spatial bias in food habits data was raised to diet study experts in an ecosystem modeling workshop. Investigators may initiate scoping to determine the extent to which spatial or temporal bias exists in the data and to develop a plan to explore the impact in the event that bias does exist. We also concur with the notion of emphasizing size/age composition in data collections for coral reef associated fish and will evaluate how to improve this in our surveys.

We concur with the importance of playing a strong role in the stewardship of data collected during the Deepwater Horizon damage assessment and in developing long-term monitoring plans going into the future that stem from this event.

Modeling and Analysis

Reviewers offered advice regarding how downscaling of regional and global climate models and their products should be carried out and used for SEFSC analyses. They applauded the intention to conduct climate vulnerability analyses on managed species in our region and had advice on using simulation approaches to evaluate ecosystem approaches to fisheries management.

Recommendations:

- **Potentially take advantage of the ESRL summary of AR5 IPCC models. There is a high-res global climate model that was developed by GFDL. Also, USGS is developing watershed models for use in climate change studies.**
- **A systematic overall vulnerability analysis needs to be performed on time scales relevant to the changes anticipated and this needs to be done in all three subregions.**
- **Use simulation testing to understand the utility of incorporating ecosystem data into stock assessments. It is the management equivalent of doing OSSEs with respect to observing systems.**
- **A shared set of global-scale hydrodynamic/NPZ/carbonate model output could serve multiple purposes for regional GOM model downscaling, and a unified regional model of those fields in the GOM could in turn serve as the boundary conditions on the finer models (e.g. coastal wetlands).**

Response: Development of a work plan for conducting climate vulnerability analyses on managed species in the region has been initiated and the work will commence in FY17. Management strategy analyses (MSE) are currently employed to evaluate the inclusion of ecosystem considerations in stock assessments. This ability will expand with the addition of a dedicated staff person to lead MSEs for the SEFSC. Modifications to our stock assessment protocols to include a “research track” provides the opportunity to more fully explore ecosystem considerations in stock assessments using simulations approaches as suggested.

Incorporation into Management and Communications

Perhaps the most important component of a successful ecosystem science program is communicating those results in a way that has utility for management and policy decisions. For example, one reviewer reflected that there is excellent work being done on increasing our understanding of linkages between living marine resources and their habitats, but stressed that more could be done to explore how to use this increasing knowledge in our science advice to decision makers.

Recommendations:

- **Find more ways to present knowledge of habitat-living marine resource linkages to decision makers that includes better ways to link habitat dynamics to the decisions they have to make among options for management.**
- **The benefits of ecosystem science to stock assessments should be summarized and communicated to fisheries stakeholders regularly.**
- **Encourage planning approaches that more completely reflect “full ecosystem” thinking. Evaluate the influence of decisions outside the agency’s jurisdiction on the success of management actions via scenario development.**
- **Consider continuing to explore genetic engineering of coral to mitigate impacts of temperature and ocean acidification trends.**

Response: We concur with these recommendations and also recognize they represent a tall order that will require continuous effort. The Ecosystem-Based Fishery Management Road Map provides insights into the incorporation of ecosystem considerations into decision making and implementation in the region will help address these recommendations.

Conclusions

The reviewer's reports were replete with observations and recommendations that will be useful in strengthening planning for and conducting ecosystem science in the region we serve. This is the fourth in the series of programmatic peer reviews carried out under the nationally-synchronized program review process within NOAA Fisheries. Progress has been made in implementing recommendations from the earlier reviews in the cycle (data collection; stock assessments; protected species). Actions stemming from recommendations made in this review will be integrated into the collective set of actions. Examination of the collective set of recommendations will also be important for resourcing and staging their implementation. Based on the evaluation of the recommendations, a suite of actions and timelines has been generated (Table 1).

Table 1. Summary of Action Items and Schedules

Action	Timeline
Management Context and Strategic Planning	
Devise a process for setting short- and longer-term ecosystem science priorities for the SEFSC and a mechanism for communicating them to partners and stakeholders.	FY17
Seek means to catalyze partnerships within NOAA (e.g. NEFSC, Chesapeake Bay Lab, National Ocean Service, NOAA Research).	FY17 - Continuous
Develop a list of potential funding opportunities and communicate to staff annually along with a list of SEFSC priorities.	FY16
Include a discussion of the role of social science in successful ecosystem-approaches to fisheries management in the upcoming social science program review.	FY17
Data	
Continue progress toward compliance with Public Access to Research Results.	FY17
Evaluate data management and computing requirements (including high performance computing) for meeting top ecosystem science priorities and develop plans for mitigating for gaps.	FY17

Action	Timeline
Continue to play a strong role in stewardship of existing data and in the development of long-term monitoring plans stemming from the Deepwater Horizon oil spill.	FY16 - Continuous
Conduct an analysis of the process for setting at-sea survey priorities in the region and look for opportunities for piggybacking data collections.	FY17
Emphasize size/age structure trends in data collections for coral reef associated species	FY17
Modeling and Analysis	
Explore the means to expand food habits data collections and analyses, cognizant of the importance of geographic and seasonal representation in modeling.	FY17
Conduct climate vulnerability analyses for species within the ecosystems served by the SEFSC.	FY17-18
Include simulation approaches to evaluate ecosystem considerations in Research Track stock assessments	FY17
Explore the utility of generating a unified set of spatially-nested models to generate efficiencies	FY17
Incorporation into Management - Communications	
Encourage planning approaches that more completely reflect "full ecosystem" thinking.	Continuous
Evaluate the impact of decisions outside the agency's jurisdiction influence the success of management within via scenario development.	FY17
Continue to pursue genetic solutions for mitigating impacts of temperature and ocean acidification in corals	FY17